



AEC-NASA TECH BRIEF



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Ultraviolet Microscopy Aids in Cytological and Biomedical Research

Ultraviolet microscopy has been used by cytologists and biochemists to study the morphological and physiological changes which occur in the living cell under varied culture conditions. The yeast cell was chosen as a suitable specimen for investigation because its content of ultraviolet-absorbing materials lies within the range of observation by ultraviolet microscopy, and its lack of motility is an important factor in the production of useful images with the available ultraviolet energy.

The yeast cells were cultured under conditions which produce a high concentration of the strongly ultraviolet-absorbing compound, S-adenosylmethionine, in the vacuole. The cells were induced to sporulate and ultraviolet photomicrographs were obtained. These showed that the vacuole is abolished at the onset of sporulation, and its contents may be observed temporarily within the old cell wall surrounding the spores. As sporulation progresses, the material is discharged into the culture medium and is not utilized. This is quite different from what occurs during budding, where the vacuolar material appears in the vacuole of the bud in a concentration indicating that parent and daughter share equally.

Ultraviolet photomicrographs of cells containing large, easily observed, cytoplasmic granules revealed that most of the granules disappeared during sporulation and that an ultraviolet-absorbing lipid substance lay between the spores, wetting them. It appeared, thus, that some of the granules were composed of, or contain, this lipid.

It is believed that the lipid material present in the granules takes part in the formation of the spore coat, especially the outer layer. Many more tests are being run to clarify this and other questions such as the role of deoxyribonucleic acid (DNA) during sporulation.

Notes:

1. This information would be of interest to biophysicists, microbiologists, biochemists, and physiologists, as it can be applied to other cytological and biochemical studies.
2. Additional details are contained in:
 - (a) *Ultraviolet Microscopy of the Vacuole of Saccharomyces Cerevisiae during Sporulation*, Journal of Bacteriology. 88, 449-456 (1964), by G. Svihla, J. L. Dainko, and F. Schlenk.
 - (b) *Biological and Medical Research Division Annual Report*, 1964, ANL-6971, pp. 21-22, Argonne National Laboratory, Argonne, Illinois. The Argonne report is available from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151; \$3.00 each (microfiche, \$0.65).
3. Inquiries concerning this innovation may be directed to:

Office of Industrial Cooperation
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439
Reference: B67-10590

Source: B. Svihla and F. Schlenk
Biological and Medical Research Division
(ARG-178)

Patent status:

Inquiries about obtaining rights for commercial use of this innovation may be made to:

Mr. George H. Lee, Chief
Chicago Patent Group
U.S. Atomic Energy Commission
Chicago Operations Office
9800 South Cass Avenue
Argonne, Illinois 60439

Category 04



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Advances in Technology and Biological Research

The Department of Energy (DOE) and the National Aeronautics and Space Administration (NASA) are jointly sponsoring a series of research and development projects in the field of biological and medical research. These projects are designed to advance the state of the art in the following areas:

- 1. **Space Biology:** Research on the effects of microgravity on biological systems, including the development of specialized life support systems for long-term space missions.
- 2. **Biotechnology:** Development of new biotechnological processes for the production of pharmaceuticals, chemicals, and other valuable products.
- 3. **Medical Research:** Investigation of the physiological and psychological effects of space flight on humans, and the development of new medical technologies for the treatment of various diseases.
- 4. **Environmental Research:** Study of the interactions between biological systems and their environment, with a particular emphasis on the development of sustainable ecosystems for space exploration.

The results of these research efforts will be disseminated through a series of technical reports, journal articles, and public information materials. For more information on these projects, contact the AEC-NASA Tech Briefs Office at the address listed above.

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